TETRA TECH

Kevin Scott
Project Manager

September 19, 2017

Mr. Robert Egan
Corrective Action Manager
Underground Storage Tanks Section
Resource Conservation and Recovery Act Branch
U.S. EPA Region 5
77 W Jackson Blvd (LR/17J)
Chicago, IL 60604

Subject: **Work Plan for Tower Standard (Revision 0)**
Leaking Underground Storage Tank (LUST) Site: Pilot Study
Lac du Flambeau, WI
Contract No. EP-S5-13-01
TDD No. S05-0020-1709-200
DTN: 2051

Dear Mr. Egan:

Tetra Tech is providing its work plan for the above-reference Site. Our attached work plan provides a detailed description our technical approach responding to the Scope of Work, including: (1) background and site history, (2) technical approach, (3) deliverables and schedules, (4) staffing plan, (5) assumptions and limitations and (6) estimated costs.

Please contact me at 312-201-7739 if you should have any questions.

Sincerely,

Kevin Scott
Project Manager

cc: TDD File

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WORK PLAN FOR TOWER STANDARD LEAKING UNDERGROUND STORAGE TANK SITE: PILOT STUDY LAC DU FLAMBEAU, WISCONSIN (Revision 0)

Prepared for

U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

Submitted by

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Chicago, IL 60606

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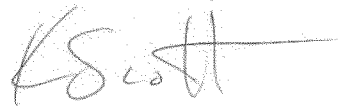

Kevin Scott
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Approved by

John Dirgo
START QC Reviewer

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) prepared this work plan in response to Technical Direction Document (TDD) S05-0020-1709-200, under Contract EP-S5-13-01 with the U.S. Environmental Protection Agency (EPA) Region 5. The Scope of Work (SOW) directs Tetra Tech to support a pilot test (pilot test) to evaluate excavation and air sparge/soil vapor extraction (AS/SVE) as potential interim measures at the site. In addition to this introduction, the work plan includes the following sections: (1) project background, (2) technical approach to tasks, (3) schedule, (4) staffing plan and (6) assumptions and limitations. Tetra Tech's cost estimate is provided as an attachment.

2.0 PROJECT BACKGROUND

This section presents background information on the Tower Standard leaking underground storage site (LUST) (Tower Standard) Site.

2.1 SITE LOCATION

The Tower Standard Site is located on fee land within the Lac du Flambeau (LDF) Indian Reservation at the intersection of State Highway 70 and County Road D near Lac du Flambeau, Wisconsin. The Site is bordered on the north by State Highway 70, to the south by a small pond and Haskell Lake, to the east by a vacant property (formerly a restaurant), and to the southwest by the Haskell Lake Lodge motel. A fireworks shop was formerly located to the north across Highway 70. Homes with private wells, some on tribal trust land, lie on the east and west sides of Haskell Lake. The Site property covers about ½ acre. The LDF tribe refers to Tower Standard Site as the Haskell Lake Petroleum Contamination Site.

2.2 SITE HISTORY

The Tower Standard gas station was built in the early 1940s and operated until 1996. Following closure of the gas station, the former gas station building was used as a bait shop in the summer months until 2015. Six underground storage tanks were located on the property; five contained leaded or unleaded gasoline and one contained waste oil. All tanks were removed in 1997.

2.3 SITE-SPECIFIC BACKGROUND INFORMATION

Table 1 presents site-specific background information and the project purpose for the Tower Standard Site.

Table 1. Site Specific Information

Site Address:	Intersection of State Highway 70 and County Road D, Lac du Flambeau, Wisconsin (on fee land within the Lac du Flambeau, Indian Reservation)
Site Latitude/ Longitude:	45°54'49.97" North, 89°54'47.74" West
Site Size/Shape:	On-half acre, approximately 166 feet by 140 feet, square
Site History (when/why site was originally developed, past uses/operators,	The Tower Standard gas station operated at the site from the early 1940s until 1996. Six underground storage tanks were on the property, five containing leaded or unleaded gasoline and one containing waste oil. The six tanks were removed in 1997. After the gas station closed, the former gas station building was used as a bait shop in the

Table 1. Site Specific Information

current use, proposed future use):	summers until about 2015. Future uses proposed for the site are not indicated in the available background information for the Site.
Existing Environmental/ Geologic Information:	Petroleum releases (gasoline) from the tanks have impacted soil and groundwater. Since 1997, site investigations identified contaminated soil and groundwater contamination beneath the former tank pit. A private well at the site and a well at an adjacent motel (directly southwest of the site) were replaced when benzene contamination was identified. A monitoring well network and groundwater pump and treat system were installed. The State closed the site in 2006, although soil and groundwater was still present; at that time, contamination was thought to be restricted to an area at, and near, the Site. Subsequent environmental investigations in the area, identified strong petroleum odors and groundwater contamination moving toward Haskell Lake (south of the site). The State reopened the site in 2014 and further site investigation has been implemented with involvement by the State, the Responsible Party's (RP) contractor, EPA, and the LDF tribe. The current understanding of the site indicates smear zone contamination in the source area, most of which is upon the restaurant property to the east of the former tank pit. This source is continuing to contaminate shallow groundwater. Contaminants also have migrated deep into groundwater and are migrating toward Haskell Lake (south of the Site), but the mass of the plume may lie below the lake bed. Private wells are not presently contaminated by the release at the site and vapor intrusion sampling does not indicate unacceptable levels; no one is currently known to be exposed to the contaminated soils. Investigations are ongoing.
Project Purpose:	Develop and implement a pilot test to evaluate the effectiveness of excavation and air sparge/soil vapor extraction (AS/SVE) to support source remediation at the Site. Based on discussion and EPA direction during the kick-off meeting with EPA on September 13, 2017, this work plan focuses on the AS/SVE technology pilot test. The Interim Measure/Corrective Measures Study Tetra Tech is supporting under a separate Technical Direction Document (TDD) will address both remedial options as follows: excavation, excavation with AS/SVE, and AS/SVE.

3.0 PROJECT APPROACH

This section presents general requirements, key project personnel, and Tetra Tech's technical approach for the proposed scope of work.

3.1 GENERAL REQUIREMENTS FOR THE WORK

Tetra Tech will support a pilot test to evaluate the effectiveness of AS/SVE a treatment technology for the Site. The SOW also includes support to demonstrate or document the feasibility of excavation. Both of these remedies have been discussed with the LDF tribe and would be acceptable to the tribe as the means to implement source reduction. Tetra Tech also will evaluate for the presence of light non-aqueous phase liquid (LNAPL) as requested by EPA via email on September 18, 2017 (Sherry Kamke of EPA Region 5). Based on discussion and EPA direction during the kick-off meeting (September 13, 2017) and EPA's goal to pilot test AS/SVE at the site this fall, this work plan addresses only the AS/SVE pilot test. Costs and support for an excavation demonstration or pilot test are not included; however, under a related TDD (TDD S05-0020-1708-008, Interim Measure/Corrective Measure Study [IM/CMS]), Tetra Tech is evaluating excavation as one of three alternatives for the site: (1) excavation, (2) AS/SVE, and (3) excavation with AS/SVE.

Tetra Tech will furnish necessary and appropriate personnel, materials and services to perform this work. Tetra Tech will communicate at least weekly with the EPA TDD Contracting Officer Representative (COR), Robert Egan, through face-to-face meetings or conference calls. Tetra Tech will maintain technical and financial records for the TDD. EPA and Tetra Tech will use electronic media whenever possible.

EPA will oversee Tetra Tech's activities for the pilot test. EPA will review deliverables to assess the likelihood that the pilot test will achieve its goals and that performance requirements have been met. Tetra Tech will submit an official record on CD and a hardcopy to the COR at the end of the project; the SOW indicates the period of performance is planned to end November 30, 2017.

3.2 KEY PROJECT PERSONNEL

Table 2 presents key project personnel and contact information for EPA and Tetra Tech.

Table 2. Key Project Personnel and Contact Information

Role	Name	Agency/ Company	Phone Number	Email Address
EPA				
EPA PO	Sam Chummar	EPA Region 5	312.886.1434	sam.chummar@epa.gov
EPA COR (Primary Project Contact)	Robert Egan	EPA Region 5	312.886.6212	robert.egan@epa.gov
EPA ERT Technical Liaison	Thomas Kady	EPA ERT	732.906.6172	Kady.Thomas@epa.gov
Tetra Tech				
R5 START Program and Project Manager	Kevin Scott	Tetra Tech	312.201.7739 (office) 856.217.6072 (cell)	kevin.scott@tetratech.com
START Supervising Lead Engineer	Dave Berestka, P.E.	Tetra Tech	303.312.8856 (office) 303-870-9669 (cell)	david.berestka@tetratech.com
START Project Engineer	Chit Christian	Tetra Tech	303.312.8863 (office) 720.935.6682 (cell)	chit.christian@tetratech.com
START Quality Control Manager	John Dirgo	Tetra Tech	312.201.7765 (office)	john.dirgo@tetratech.com

Notes: EPA = U.S. Environmental Protection Agency; ERT = Environmental Response Team; P.E. = Professional Engineer; PO = Project Officer; COR = Contract Officer Representative; START = Superfund Technical Assessment and Response Team.

3.3 TECHNICAL APPROACH TO TASKS

Tetra Tech will provide support for a pilot test of AS/SVE, which is being evaluated as an interim measure to address source area contamination at the Site. Project tasks are described in the following subsections.

3.3.1 Task 1: Implement Project Planning and Support

Tetra Tech will implement project planning and support to ensure work addresses EPA needs for the pilot test.

3.3.1.1 Implement Project Planning

This task includes efforts related to project initiation, as follows:

3.3.1.1.1: Attend Kickoff Meeting - Tetra Tech and EPA participated in a kick-off meeting (via conference call) on September 13, 2017. This call was attended by the key project personnel indicated in Table 1 (minus John Dirgo), with additional EPA representatives including: Sherry Kamke (EPA Region 5 UST Section Chief, Resource Conservation and Recovery Act Branch) and Thomas Kady and other technical representatives from the EPA Environmental Response Team (ERT). During this call, Tetra Tech and EPA reviewed the SOW, site history, stakeholder input, technical requirements, and schedule goals for the work.

This work plan documents discussion and EPA direction provided during this kick-off meeting. The technical approach is designed to streamline efforts to help achieve EPA's schedule goals for the pilot test and the related IM/CMS being implemented under a separate TDD. To support expedited work, Tetra Tech is using a consistent staffing approach for both TDDs.

3.3.1.1.2: Prepare Pilot Study Work Plan - Tetra Tech prepared this draft work plan to document planned activities, schedules, staffing plans, assumptions and limitations, and estimated costs. It also incorporates verbal information and direction provided by EPA during the kick-off meeting. During the kick-off meeting, particular attention was paid to discussing the sequence of events to coordinate logistics and provide a realistic, but aggressive, pilot test schedule. Tetra Tech will revise this draft work plan to address any comments that EPA provides.

3.3.1.2 Implement Project Management

Tetra Tech will implement project management including: management and tracking of costs, preparation of Monthly Progress Reports, attendance at project meetings, and preparation and submittal of invoices. The period of performance is currently issued through November 30, 2017. Tetra Tech also will participate in meetings and conference calls to share and review project progress. We estimate five meetings, with one to two Tetra Tech staff in attendance, for a total of 15 hours.

3.3.2 Task 2: Prepare Site-Specific Plans

This section provides Tetra Tech's approach to develop the project's quality assurance project plan (QAPP), health and safety plan (HASP), and pilot test plan.

3.3.2.1 Prepare Site-Specific QAPP

During the kick-off meeting, the team discussed using the Superfund Technical Assessment and Response Team (START) contract program Quality Assurance Project Plan (QAPP) or a site-specific QAPP. Because most of the work is covered under the program QAPP, EPA directed that the START program QAPP should be used. Any items not addressed in the program QAPP will be addressed through a sampling and analysis plan or pilot test plan (see 3.3.2.3). The Region 5 START program QAPP has been previously reviewed approved by EPA Region 5.

The QAPP and supplemental documentation will address all environmental data collection, generation, and/or use – including use of existing data identified in this TDD. As follow up to the kick-off meeting, Tetra Tech provided the START QAPP to the EPA Region 5 site QAPP review lead, Zackary Sasnow. He reviewed the program QAPP and determined that the program QAPP, supplemented by a plan for site-specific requirements not addressed in the program QAPP would be sufficient to meet QA/QC needs for the pilot test.

3.3.2.2 Prepare Site-Specific HASP

Tetra Tech will prepare a site-specific HASP to support pilot test field activities. The HASP will follow the format that Tetra Tech uses for other START HASPs, with information including: site location, health and safety (H&S) and site contacts, anticipated contaminants and site hazards, appropriate safe work practices, basic training requirements, H&S protection and equipment, a site map and emergency route to the nearest hospital, and other H&S information. The draft HASP will be reviewed and approved by a Tetra Tech regional H&S representative before use.

Tetra Tech will prepare a draft HASP according to the schedule in Table 3. Tetra Tech will provide a revised HASP upon receipt of any comments from EPA.

3.3.2.3 Prepare Site-Specific Pilot Test Plan

Tetra Tech will prepare a draft Pilot Test Plan and submit it to EPA for review and comment. The Pilot Test Plan will describe the technology to be tested, test objectives, test equipment or systems, experimental procedures, conditions to be tested, measurements of performance, analytical methods, data management and analysis, and residuals management. The Pilot Test Plan will also document Data Quality Objectives. During the kick-off meeting, EPA and Tetra Tech also discussed appropriate remedial action objectives for the IM/CMS, which is related to the pilot test. Given the immediate goal to address source area contamination, EPA stated that percent mass reduction goals are appropriate. Specifically, the interim measure should target at least 90% reduction in source area contaminant mass, and ideally closer to 95% reduction. The interim corrective measure should allow transition to a final remedy that may target numerical goals such as maximum contaminant levels (MCLs) in groundwater. The pilot test will evaluate the effectiveness of AS/SVE technology at the site.

Resources to support the Pilot Test Plan were discussed during the kick-off meeting and include: (1) input from Thomas Kady and other staff of EPA ERT, (2) a written summary of recommendations for the pilot test prepared by EPA ERT and shared with Tetra Tech via email, and (3) background information provided to support the IM/CMS report. As additional background, EPA ERT explained that its approach to the pilot test includes a set up and configuration that is more costly than a typical pilot test for AS/SVE. The benefit of this approach is that it can immediately be scaled up for interim measure implementation following the pilot test. EPA also clarified that the pilot test and interim measure focus on the source area of the plume (generally under the asphalt paved area on the site); if the treatment proves successful (as anticipated), the system could be used to address other areas of the plume over time.

During the kick-off meeting, Robert Egan of EPA stated that Tetra Tech and EPA ERT should communicate regarding technical matters to support preparation of the Pilot Test Plan. This communication will help ensure background information, previous study considerations, and current priorities and contacts are shared. This also will help expedite the Pilot Test Plan review process.

Tetra Tech and EPA also discussed the acceptability of oxygen or ozone sparging as process options for the interim measure. EPA has not received input from the LDF tribe on this matter. However, EPA and Tetra Tech agreed that this information was not necessary for planning the pilot test focusing only on AS/SVE. Therefore, EPA will not request input from the LDR tribe at this time.

During the kick-off meeting, EPA stated that an EPA Region 8 AS/SVE mobile unit could support expedited pilot testing. The unit could be available for testing in the near term. EPA provided specifications for this unit to Tetra Tech, so that this unit's specifications can be reviewed and incorporated, as appropriate, in the Pilot Test Plan.

The Pilot Test Plan will describe pilot test objectives, procedures, materials, and equipment. The Pilot Test Plan will provide a schedule for performing the pilot test with specific dates for each task and subtask, including EPA review periods. Key milestones include, but are not limited to: the procurement of contractors, well installation, sample collection, sample analysis, system installation, system startup, system shutdown, and reporting of Pilot Test results.

Tetra Tech's Pilot Test Plan also will describe how Tetra Tech will address air emissions (assumed to be treated with vapor-phase granular activated carbon prior to being discharged to atmosphere during pilot test) and disposal requirements remediation-derived waste. Tetra Tech understands that wastes (soil cuttings and well development/purge water) must be transported off site for disposal (based on EPA communications and agreements with the LDF tribe).

Tetra Tech will incorporate comments provided by EPA and submit the final Pilot Test Plan within 5 days.

3.3.3 Task 3: Implement Pilot Test Field Work

Tetra Tech will implement the pilot test to evaluate the effectiveness of the AS/SVE technology for addressing contamination at the Site. While the SOW specifies that excavation and AS/SVE will be evaluated, this work plan addresses pilot testing of the AS/SVE technology only (as discussed during the kick-off meeting). Tetra Tech will coordinate with EPA Region 5 and EPA ERT as the pilot test field work is implemented. As directed by EPA during the kick-off meeting, Tetra Tech will base the AS/SVE pilot test work plan on the draft pilot test outline and considerations prepared by Thomas Kady (EPA ERT) and provided to Tetra Tech.

To implement the pilot test, Tetra Tech will implement the following activities.

3.3.3.1 Procure Field Subcontractors, Materials and Equipment

Tetra Tech will procure vendors, materials and equipment to support the field pilot test. Field work will be implemented as soon as feasible (with the goal of implementing field work in the fall of 2017).

To support the pilot test, Tetra Tech will procure and oversee a driller to install the following required wells and perform the following associated activities:

- Six vertical, 4-inch diameter SVE wells will be installed to a depth of 15 feet (or less) via hollow stem auger.
- Three deep (up to 60 feet deep), 2-inch diameter air sparge wells will be installed (may be direct push).
- Three shallow (up to 25 feet deep) 2-inch diameter air sparge wells will be installed (may be direct push).
- Three deep monitoring wells (50 feet deep) will be installed (may be direct push).
- Three shallow monitoring wells (25 feet deep) will be installed (may be direct push).
- Three vadose soil gas zone monitoring points will be installed.
- All 12 new groundwater wells will be developed by the driller.
- The six SVE wells and three vadose zone soil gas monitoring points will not be developed
- All groundwater and vapor wells will be logged (except if the sparge wells are installed by direct push)
- Well development water will be collected and disposed of offsite at the City of Wausau publicly owned treatment works (POTW) by the driller (about 80 miles from the site).

These wells will be designed and installed so that they can be used as part of the interim and/or final CMS remedy, if AS/SVE is selected as the remediation technology.

During the kick-off meeting, EPA stated that a Region 8 AS/SVE trailer unit can be used to expedite the pilot test schedule. If this unit is not available, Tetra Tech will procure a pilot test unit from an external vendor, which will increase cost and may delay the schedule. Tetra Tech will procure all additional necessary materials, equipment and services to implement the pilot test. EPA has provided some names of drillers familiar with the site and Tetra Tech will contact these drillers to check availability and qualifications.

3.3.3.2 Provide Analytical Services

Tetra Tech will arrange for off-site analytical services using established master services agreements with analytical laboratories to the extent feasible. If necessary, additional specialty laboratory services will be procured.

3.3.3.3 Test and Operate Equipment

Tetra Tech will provide field staff for oversight and pilot test observation; these staff also will be able to operate the pilot test equipment.

3.3.3.4 Retrieve Samples for Testing .

Tetra Tech field staff will collect, package, label and transport samples for off-site analysis. These samples will be collected and managed as specified in the START program QAPP and the site-specific QAPP addendum (SAP or pilot test plan).

On September 18, 2017, EPA requested via email that field work include the evaluation/testing of LNAPL. Evaluation for LNPAPL can include using an oil water interface probe for all monitoring well gauging. Testing for LNAPL could also include methods using LNAPL field test kits for soil (which provide mixed results) to expensive soil core sample collection and freezing, with subsequent analysis for LNAPL saturation, LNAPL viscosity, and number of other parameters. Additional methods also available vary in cost, usefulness, and complexity. The absence of LNAPL or presence of limited amounts of mobile LNAPL does not significantly impact the remedy approach—as small amounts of gasoline LNAPL can be remediated by either excavation or AS/SVE.

Previous groundwater monitoring at the site has not detected measureable LNAPL thickness in any of the site monitoring wells. A sheen may have been observed in VAS-11 at 40 feet below ground surface (bgs). Some of the high contaminant concentration in excess of 1 percent of their effective solubility suggest that residual LNAPL, and possibly mobile LNAPL, is present in the source area at the site.

Tetra Tech's technical approach includes visual field inspection of soil samples for sheen and oil droplets and a shake test, where a sample of soil and groundwater is collected in jar and shaken vigorously, causing mobile LNAPL to separate from the soil matrix and float on the water surface (Interstate Technology & Regulatory Council 2009). To support evaluation for LNAPL, groundwater level measurements will be conducted with an oil/water interface probe.

Thus, Tetra Tech has included conducting one to two shake tests per borehole in the most visually-impacted soil horizon and/or where PID measurements exceed 1,000 parts per million by volume (ppmv). Tetra Tech has also included use of an oil/water interface probe in this work plan and cost estimate.

3.3.3.5 Perform Laboratory Analysis and Evaluate Data

As stated in Section 3.3.3.2, Tetra Tech will procure laboratory analytical services. All laboratory data will be validated by Tetra Tech chemists. Tetra Tech also will evaluate analytical and field-based measurement results for the pilot test.

3.3.3.6 Characterize and Dispose of Residuals

Tetra Tech will conduct sampling and analysis, as necessary, to characterize residuals or will arrange with subcontractors for waste characterization. Based on waste characterization, Tetra Tech will arrange for off-site disposal of wastes with or without pre-treatment. Tetra Tech understands the LDF tribe and EPA have agreed that generated residual materials will be managed off site.

3.4 Prepare Pilot Test Report

Tetra Tech will use the findings from Task 3 to prepare and submit the Draft Pilot Test Report. During the kick-off meeting, EPA and Tetra Tech discussed whether the pilot documentation (test plan and results report) should be incorporated into the IM/CMS report (being implemented under TDD S05-0020-1708-008). Tetra Tech recommended it would be more efficient to keep the pilot test plan and pilot test report separate from the IM/CMS draft report. However, Tetra Tech stated that given the anticipated timing of events and documentation, pilot test findings likely could be incorporated into the IM/CMS report. EPA concurred with this approach.

The Draft Pilot Test Report will describe the performance of the AS/SVE system during pilot test and the results of the test. Tetra Tech's report will discuss radius of influence, flow rates, air emissions, water table response, and geochemistry. Tetra Tech will provide a revised and Final Pilot Test Report to incorporate comments provided by EPA.

3.5 Provide Post Pilot Test Support

As directed by EPA, Tetra Tech will provide post-pilot test support. This may include supporting technical meetings and briefings, supporting presentations and meetings with the LDF tribe to describe pilot test findings, and providing any other support as directed by EPA.

4.0 SCHEDULE AND DELIVERABLES

Tetra Tech understands that the goal for pilot test support is to complete work by November 30, 2017. As discussed with EPA, an aggressive schedule is required to accomplish the work within this timeframe. As directed by EPA, Tetra Tech has reviewed the SOW, background information provided by EPA, and input and direction from the kick-off meeting and has applied its professional experience to develop the realistic but aggressive schedule shown in Table 3. Table 3 presents the SOW reference, deliverables and associated dates for deliverable; Tetra Tech recommends EPA and Tetra Tech discuss the schedule in greater detail with review of the draft work plan, as information on the availability of vendor and subcontractor is being obtained in an ongoing manner.

Table 3. Schedule of Deliverables

SOW Reference	Deliverable	Due Date
Task 1.1.4.1	Draft Pilot Study Work Plan	As soon as possible (as agreed during the kick-off meeting)
Task 1.1.4.2	Revised Pilot Study Work Plan	5 days after receipt of comments from EPA on work plan
2.1	START Program QAPP	Provided to EPA on September 14, 2017
2.1	Draft site-specific SAP to supplement QAPP (a separate document or developed with the test plan, see Task 2.3)	15 days of receiving TDD (TDD received on September 8, 2017)
2.1	Final site-specific SAP to supplement QAPP (a separate document or developed with the test plan, see Task 2.3)	Within 5 days of receiving comments from EPA on SAP
2.2	Draft HASP	15 days after receipt of EPA TDD
2.2	Final HASP	Within 5 days of receiving any comments on HASP from EPA
2.3	Draft Pilot Test Plan	15 days after receipt of EPA TDD
2.3	Final Pilot Test Plan	5 days after receipt of comments on test plan from EPA

Table 3. Schedule of Deliverables

3	Pilot Study Field Work	As soon as possible after approval of Pilot Test Plan
4	Draft Pilot Test Report	10 days after completion of the pilot test or 10 days after receipt of laboratory data (whichever is later)
4	Final Pilot Test Report	5 days after receipt of comments on pilot test report from EPA

5.0 STAFFING PLAN

Table 4 shows Tetra Tech's staffing plan and estimated hours by task for this work. Given the expedited schedule and focused technical needs, Tetra Tech's key staff include two engineers experienced in performing technology evaluations for a range of hazardous waste sites, including sites with petroleum contamination.

Table 4. Staffing Plan

Name	Role (Labor Category)	Tasks and Hours				
		1 - Project Management	2 – Site-Specific Plans	3 – Pilot Test Field Work	4 – Pilot Test Report	5 – Additional Support
Kevin Scott	START Program and Project Manager (Principal Professional)	4	4	8	4	4
Dave Berestka, PE	Supervising Lead Engineer (Principal Professional)	4	16	44	40	16
Chit Christian	Senior Engineer (Engineer IV)	0	20	6	0	0
Adam Peterca	Engineer (Engineer III)	0	0	4	20	0
Andrew Carlson	Engineer (Engineer II)	0	4	0	0	10
Heather Wood	Senior Geologist (Scientist IV)	0	0	0	0	0
Matt Villacana	Scientist (Scientist III)	0	8	80	40	0
Maggie Banh	Multimedia/GIS/Graphics (IT Professional III)	0	4	2	10	0

Table 4. Staffing Plan

Carla Buriks	Work Plan and Technical Support (Principal Professional)	3	0	4	0	0
John Dirgo	START Quality Control Reviewer (Principal Professional)	1	4	4	4	0
Butch Fries	START Editorial Reviewer (Reports) (Technical Support Staff II)	2	0	4	0	0
To be determined	Environmental Technician II	0	4	0	0	0
Rindy Mortensen	Procurement (Administrative Support	0	2	0	0	0
Totals	**Project Total = 382**	**16**	**66**	**152**	**118**	**30**

6.0 ASSUMPTIONS AND LIMITATIONS

Assumptions and limitations can impact the approach, schedule and costs provided in this work plan. Tetra Tech's assumptions and identification of potential limitations on the work are provided below.

- The schedule and cost estimate assume that the EPA Region 8 AS/SVE unit is available and can be delivered to the site in a timely manner and at no cost to Tetra Tech. If Tetra Tech must procure an AS/SVE unit or arrange and pay for transport of the Region 8 unit, this could impact procurement time and/or other direct costs (equipment rental and site delivery). Tetra Tech assumes EPA and Tetra Tech will discuss the schedule with draft work plan review as calls and communication are ongoing with EPA parties and vendors/subcontractors.
- EPA will provide timely reviews and approvals to support the expedited schedule.
- All access agreements for the Site are in place and site access will be readily available and will not delay field work.
- Contaminated soil vapor extracted by the SVE system can be treated via vapor-phase granular activated carbon before being discharged to the atmosphere during the pilot test.
- Six vertical, 2-inch diameter SVE wells will be installed to a depth of 15 feet or less.
- Three deep (up to 60 feet deep), 2-inch diameter air sparge wells will be installed.
- Three shallow (up to 25 feet deep) 2-inch diameter air sparge wells will be installed.
- Three deep monitoring wells (50 feet deep) will be installed.
- Three shallow monitoring wells (25 feet deep) will be installed.
- Three vadose soil gas zone monitoring point will be installed.
- All 18 new wells will be developed by the driller.
- Well development water will be collected and disposed of offsite at the City of Wausau POTW by the driller.
- Soil cuttings will be collected and disposed of offsite.
- The cost estimate assumes that expedited analytical services are used and that all laboratory data will be validated by Tetra Tech.

- Weather conditions do not impede field test activities planned for fall 2017.
- Subcontracted laboratories are used for analytical services. If EPA laboratory services could be used, analytical costs would be reduced.
- The pilot test will require the following field equipment (in addition to the AS/SVE pilot test trailer unit):
  - Two downhole (1.5-inch or smaller) diameter dissolved oxygen probes
  - One photoionization detector, RAE 3000 or equal
  - One landfill gas meter (methane, carbon dioxide, and oxygen) (Landtec GEM 2000 or equal)
  - One peristaltic pump and associated disposable tubing (for groundwater sample collection)
  - One YSI multi-parameter water quality meter with flow-through cell
  - One thermal anemometer
  - One oil/water interface probe
  - Two Dwyer Mark 475 digital manometers
  - Six Dwyer magnehelic analog manometers
  -
- Monitoring well installation and groundwater sampling will require the following equipment:
  - One photoionization detector, RAE® 3000 or equal
  - One YSI multiparameter water quality meter with flow-through cell
  - One landfill gas meter (methane, carbon dioxide, and oxygen). Landtec GEM 2000 or equal
  - One peristaltic pump and associated disposable tubing
  - One oil/water interface probe
- The six new groundwater monitoring wells will be sampled before. Samples will be analyzed for total petroleum hydrocarbons (gasoline) (TPH-g), volatile organic compounds (VOCs), and aerobic petroleum degrading bacteria.
- Extracted vapor samples will be collected and analyzed for VOCs (EPA Method TO-15 and fixed gases (ASTM D 1946). A total of 16 vapor samples will be collected using 6-liter batch certified summa canisters.
- A generator capable of providing electrical power at the proper voltage/phase will be rented for the duration of the test.
- Two portable vapor phase granular activated carbon units will be mobilized to the site and plumbed in series to treat the extracted soil vapor
- A local licensed electrician will be hired to connect the AS/SVE pilot test trailer to the generator.
- The AS/SVE pilot test setup, testing, and breakdown will be completed in 5 field days and will include at a minimum, SVE step tests on two SVE wells, AS step tests on a shallow and a deep air sparge well, and a combined AS/SVE test (to evaluate effect of air sparging on SVE vapor concentration. No permitting or other external agency approval process requirements are assumed; these could impact the project cost and schedule.

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE: September 14, 2017
PROJECT/SITE NAME: Tower Standard Site Pilot Test
TO: Robert Egan
FROM: Kevin Scott
TDD Ceiling Amount: **% expended** 75% **Budget remaining** $ -

Task #: 1 **Task Name/Description** Project Management and Planning

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	12	Hours	$127.54	$1,530.52
	Project Manager		Hours	$101.29	$0.00
	Scientist IV	2	Hours	$93.01	$186.02
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II	2	Hours	$28.60	$57.20
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**16**			**$1,773.73**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: 2 **Task Name/Description** Prepare Site-Specific Plan (QAPP, SAP, HASP, Test Plan)

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	24	Hours	$127.54	$3,061.03
	Project Manager		Hours	$101.29	$0.00
	Scientist IV	8	Hours	$93.01	$744.06
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV	20	Hours	$103.34	$2,066.74
	Engineer III		Hours	$83.60	$0.00
	Engineer II	4	Hours	$56.70	$226.79
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	4	Hours	$107.03	$428.13
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II	4	Hours	$28.60	$114.40
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support	2	Hours	$46.28	$92.56
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**66**			**$6,733.71**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

% expended 75% **Budget remaining** $ -

SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: 3 **Task Name/Description** Implement Pilot Scale Test

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	60	Hours	$127.54	$7,652.59
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III	80	Hours	$82.35	$6,587.78
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV	6	Hours	$103.34	$620.02
	Engineer III	4	Hours	$83.60	$334.39
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	2	Hours	$107.03	$214.07
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**152**			**$15,408.84**
ODCs	Airfare	1	**Ticket**	$400.00	$400.00
	Hotel	15	**Nights**	$100.00	$1,500.00
	Per diem	15	**Nights**	$51.00	$765.00
	Rental Vehicle	3.5	**Weeks**	$300.00	$1,050.00
	Fuel	40	**Gallons**	$2.75	$110.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs	1	**Total**	$1,750.00	$1,750.00
	Field supplies				$0.00
	Other: Vapor-Phase GAC rental/delivery	2	**ea**	$1,000.00	$2,000.00
	Other: Generator Rental	1	**Weeks**	$300.00	$300.00
	Other:				$0.00
	G&A on ODCs				**$376.43**
	Subtotal of ODC Costs				**$8,251.43**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
	Water Disposal	500	**Gallons**	$0.35	$175.00
	Drilling	1	**Total**	$10,000.00	$10,000.00
	Soil Cutting Disposal	20	**drum**	$100.00	$2,000.00
	Analytical Subcontractor cost				
	Analytical (TO-15 Summa Cannister)	16	**Total**	$200.00	$3,200.00
	Electrician for Generator Connection	1	**ls**	$150.00	$150.00
	Analytical EPA 8260	7	**ea**	$150.00	$1,050.00
	Subtotal of Subcontractor Costs				**$16,575.00**
				Task Subtotal	

Task #: 4 **Task Name/Description** Prepare Pilot Test Report

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	48	Hours	$127.54	$6,122.07
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III	40	Hours	$82.35	$3,293.89
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III	20	Hours	$83.60	$1,671.93
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	10	Hours	$107.03	$1,070.33
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**118**			**$12,158.22**
	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

% expended 75% **Budget remaining** $ -

ODCs	Fuel					$0.00
	Tolls and Parking					$0.00
	POV mileage					$0.00
	Equipment Rental Costs					$0.00
	Field supplies					$0.00
	Other:					$0.00
	Other:					$0.00
	Other:					$0.00
	G&A on ODCs					**$0.00**
	Subtotal of ODC Costs					**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**					
	Drillers					$0.00
						$0.00
						$0.00
	Analytical Subcontractor cost					
						$0.00
						$0.00
						$0.00
	Subtotal of Subcontractor Costs					**$0.00**
					Task Subtotal	

Task #: 5 **Task Name/Description** Provide Follow-up Support

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	20	Hours	$127.54	$2,550.86
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II	10	Hours	$56.70	$566.97
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**30**			**$3,117.83**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: **Task Name/Description**

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

		% expended	75%	Budget remaining	$ -
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**0**			**$0.00**
ODCs	Airfare			$10.00	$0.00
	Hotel			$10.00	$0.00
	Per diem			$10.00	$0.00
	Rental Vehicle			$10.00	$0.00
	Fuel			$10.00	$0.00
	Tolls and Parking			$10.00	$0.00
	POV mileage			$10.00	$0.00
	Equipment Rental Costs			$10.00	$0.00
	Field supplies			$10.00	$0.00
	Other:_____			$10.00	$0.00
	Other:_____			$10.00	$0.00
	Other:			$10.00	$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
					Task Subtotal

Task #: ☐ Task Name/Description

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**0**			**$0.00**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:_____				$0.00
	Other:_____				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
					Task Subtotal

Task #: ☐ Task Name/Description

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017					
PROJECT/SITE NAME:	Tower Standard Site Pilot Test					
TO:	Robert Egan					
FROM:	Kevin Scott					
TDD Ceiling Amount:		**% expended**	75%	**Budget remaining**	$	-
Labor Cost	Engineer IV		Hours	$103.34		$0.00
	Engineer III		Hours	$83.60		$0.00
	Engineer II		Hours	$56.70		$0.00
	Engineer I		Hours	$44.84		$0.00
	IT Professional III		Hours	$107.03		$0.00
	IT Professional II		Hours	$64.12		$0.00
	GIS Professional II		Hours	$55.69		$0.00
	Environmental Technician II		Hours	$28.60		$0.00
	Environmental Technician I		Hours	$22.58		$0.00
	Technical Support Staff II		Hours	$60.30		$0.00
	Technical Support Staff I		Hours	$36.61		$0.00
	Administrative Support		Hours	$46.28		$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52		$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29		$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53		$0.00
	Subtotal of Labor Costs	**0**				**$0.00**
ODCs	Airfare					$0.00
	Hotel					$0.00
	Per diem					$0.00
	Rental Vehicle					$0.00
	Fuel					$0.00
	Tolls and Parking					$0.00
	POV mileage					$0.00
	Equipment Rental Costs					$0.00
	Field supplies					$0.00
	Other:_____					$0.00
	Other:_____					$0.00
	Other:					$0.00
	G&A on ODCs					**$0.00**
	Subtotal of ODC Costs					**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**					
						$0.00
						$0.00
						$0.00
	Analytical Subcontractor cost					
						$0.00
						$0.00
						$0.00
	Subtotal of Subcontractor Costs					**$0.00**
					Task Subtotal	

Total Labor Hours	**382**		
Total Labor Cost			$39,192.34
Average cost/labor hour		**$102.60**	
Total ODCs			$8,251.43
Total Subcontractor Costs			$16,575.00
Subtotal of All Costs			**$64,018.77**
Contingency (15%)			$9,602.81
Total			**$73,621.58**
AMOUNT NEEDED (Total minus remaining budget)			**$73,621.58**

* - Task order 11 labor category

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE: September 14, 2017
PROJECT/SITE NAME: Tower Standard Site Pilot Test
TO: Robert Egan
FROM: Kevin Scott
TDD Ceiling Amount: **% expended** 75% **Budget remaining** $ -

Task #: 1 **Task Name/Description** Project Management and Planning

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	12	Hours	$127.54	$1,530.52
	Project Manager		Hours	$101.29	$0.00
	Scientist IV	2	Hours	$93.01	$186.02
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II	2	Hours	$28.60	$57.20
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**16**			**$1,773.73**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: 2 **Task Name/Description** Prepare Site-Specific Plan (QAPP, SAP, HASP, Test Plan)

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	24	Hours	$127.54	$3,061.03
	Project Manager		Hours	$101.29	$0.00
	Scientist IV	8	Hours	$93.01	$744.06
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV	20	Hours	$103.34	$2,066.74
	Engineer III		Hours	$83.60	$0.00
	Engineer II	4	Hours	$56.70	$226.79
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	4	Hours	$107.03	$428.13
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II	4	Hours	$28.60	$114.40
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support	2	Hours	$46.28	$92.56
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**66**			**$6,733.71**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

% expended 75% **Budget remaining** $ -

SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: 3 **Task Name/Description** Implement Pilot Scale Test

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	60	Hours	$127.54	$7,652.59
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III	80	Hours	$82.35	$6,587.78
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV	6	Hours	$103.34	$620.02
	Engineer III	4	Hours	$83.60	$334.39
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	2	Hours	$107.03	$214.07
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**152**			**$15,408.84**
ODCs	Airfare	1	**Ticket**	$400.00	$400.00
	Hotel	15	**Nights**	$100.00	$1,500.00
	Per diem	15	**Nights**	$51.00	$765.00
	Rental Vehicle	3.5	**Weeks**	$300.00	$1,050.00
	Fuel	40	**Gallons**	$2.75	$110.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs	1	**Total**	$1,750.00	$1,750.00
	Field supplies				$0.00
	Other: Vapor-Phase GAC rental/delivery	2	**ea**	$1,000.00	$2,000.00
	Other: Generator Rental	1	**Weeks**	$300.00	$300.00
	Other:				$0.00
	G&A on ODCs				**$376.43**
	Subtotal of ODC Costs				**$8,251.43**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
	Water Disposal	500	**Gallons**	$0.35	$175.00
	Drilling	1	**Total**	$10,000.00	$10,000.00
	Soil Cutting Disposal	20	**drum**	$100.00	$2,000.00
	Analytical Subcontractor cost				
	Analytical (TO-15 Summa Cannister)	16	**Total**	$200.00	$3,200.00
	Electrician for Generator Connection	1	**ls**	$150.00	$150.00
	Analytical EPA 8260	7	**ea**	$150.00	$1,050.00
	Subtotal of Subcontractor Costs				**$16,575.00**
				Task Subtotal	

Task #: 4 **Task Name/Description** Prepare Pilot Test Report

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	48	Hours	$127.54	$6,122.07
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III	40	Hours	$82.35	$3,293.89
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III	20	Hours	$83.60	$1,671.93
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III	10	Hours	$107.03	$1,070.33
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**118**			**$12,158.22**
	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

% expended 75% **Budget remaining** $ -

ODCs	Fuel					$0.00
	Tolls and Parking					$0.00
	POV mileage					$0.00
	Equipment Rental Costs					$0.00
	Field supplies					$0.00
	Other:					$0.00
	Other:					$0.00
	Other:					$0.00
	G&A on ODCs					**$0.00**
	Subtotal of ODC Costs					**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**					
	Drillers					$0.00
						$0.00
						$0.00
	Analytical Subcontractor cost					
						$0.00
						$0.00
						$0.00
	Subtotal of Subcontractor Costs					**$0.00**
					Task Subtotal	

Task #: 5 **Task Name/Description** Provide Follow-up Support

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional	20	Hours	$127.54	$2,550.86
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II	10	Hours	$56.70	$566.97
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**30**			**$3,117.83**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:				$0.00
	Other:				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
				Task Subtotal	

Task #: **Task Name/Description**

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017
PROJECT/SITE NAME:	Tower Standard Site Pilot Test
TO:	Robert Egan
FROM:	Kevin Scott
TDD Ceiling Amount:	

		% expended	75%	Budget remaining	$ -
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**0**			**$0.00**
ODCs	Airfare			$10.00	$0.00
	Hotel			$10.00	$0.00
	Per diem			$10.00	$0.00
	Rental Vehicle			$10.00	$0.00
	Fuel			$10.00	$0.00
	Tolls and Parking			$10.00	$0.00
	POV mileage			$10.00	$0.00
	Equipment Rental Costs			$10.00	$0.00
	Field supplies			$10.00	$0.00
	Other:_____			$10.00	$0.00
	Other:_____			$10.00	$0.00
	Other:			$10.00	$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
					Task Subtotal

Task #: ☐ Task Name/Description

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor Cost	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00
	Engineer IV		Hours	$103.34	$0.00
	Engineer III		Hours	$83.60	$0.00
	Engineer II		Hours	$56.70	$0.00
	Engineer I		Hours	$44.84	$0.00
	IT Professional III		Hours	$107.03	$0.00
	IT Professional II		Hours	$64.12	$0.00
	GIS Professional II		Hours	$55.69	$0.00
	Environmental Technician II		Hours	$28.60	$0.00
	Environmental Technician I		Hours	$22.58	$0.00
	Technical Support Staff II		Hours	$60.30	$0.00
	Technical Support Staff I		Hours	$36.61	$0.00
	Administrative Support		Hours	$46.28	$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52	$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29	$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53	$0.00
	Subtotal of Labor Costs	**0**			**$0.00**
ODCs	Airfare				$0.00
	Hotel				$0.00
	Per diem				$0.00
	Rental Vehicle				$0.00
	Fuel				$0.00
	Tolls and Parking				$0.00
	POV mileage				$0.00
	Equipment Rental Costs				$0.00
	Field supplies				$0.00
	Other:_____				$0.00
	Other:_____				$0.00
	Other:				$0.00
	G&A on ODCs				**$0.00**
	Subtotal of ODC Costs				**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**				
					$0.00
					$0.00
					$0.00
	Analytical Subcontractor cost				
					$0.00
					$0.00
					$0.00
	Subtotal of Subcontractor Costs				**$0.00**
					Task Subtotal

Task #: ☐ Task Name/Description

	Labor Category	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	Principal Professional		Hours	$127.54	$0.00
	Project Manager		Hours	$101.29	$0.00
	Scientist IV		Hours	$93.01	$0.00
	Scientist III		Hours	$82.35	$0.00
	Scientist II		Hours	$59.99	$0.00
	Scientist I		Hours	$43.80	$0.00

R5 START COST ESTIMATE
CONTRACT # EP S5 13 01
TDD No: 0020/S05-0020-1709-200

DATE:	September 14, 2017					
PROJECT/SITE NAME:	Tower Standard Site Pilot Test					
TO:	Robert Egan					
FROM:	Kevin Scott					
TDD Ceiling Amount:		**% expended**	75%	**Budget remaining**	$	-
Labor Cost	Engineer IV		Hours	$103.34		$0.00
	Engineer III		Hours	$83.60		$0.00
	Engineer II		Hours	$56.70		$0.00
	Engineer I		Hours	$44.84		$0.00
	IT Professional III		Hours	$107.03		$0.00
	IT Professional II		Hours	$64.12		$0.00
	GIS Professional II		Hours	$55.69		$0.00
	Environmental Technician II		Hours	$28.60		$0.00
	Environmental Technician I		Hours	$22.58		$0.00
	Technical Support Staff II		Hours	$60.30		$0.00
	Technical Support Staff I		Hours	$36.61		$0.00
	Administrative Support		Hours	$46.28		$0.00
	SME 1 - Sr. Hydro *		Hours	$148.52		$0.00
	SME 2 - Sr. Env. Sci. *		Hours	$151.29		$0.00
	SME 3 - Sr. Env. Eng. *		Hours	$169.53		$0.00
	Subtotal of Labor Costs	**0**				**$0.00**
ODCs	Airfare					$0.00
	Hotel					$0.00
	Per diem					$0.00
	Rental Vehicle					$0.00
	Fuel					$0.00
	Tolls and Parking					$0.00
	POV mileage					$0.00
	Equipment Rental Costs					$0.00
	Field supplies					$0.00
	Other:_____					$0.00
	Other:_____					$0.00
	Other:					$0.00
	G&A on ODCs					**$0.00**
	Subtotal of ODC Costs					**$0.00**
SUBCONTRACTOR COSTS	**Non analytical subcontractor cost**					
						$0.00
						$0.00
						$0.00
	Analytical Subcontractor cost					
						$0.00
						$0.00
						$0.00
	Subtotal of Subcontractor Costs					**$0.00**
					Task Subtotal	

Total Labor Hours	**382**		
Total Labor Cost			$39,192.34
Average cost/labor hour		**$102.60**	
Total ODCs			$8,251.43
Total Subcontractor Costs			$16,575.00
Subtotal of All Costs			**$64,018.77**
Contingency (15%)			$9,602.81
Total			**$73,621.58**
AMOUNT NEEDED (Total minus remaining budget)			**$73,621.58**

* - Task order 11 labor category